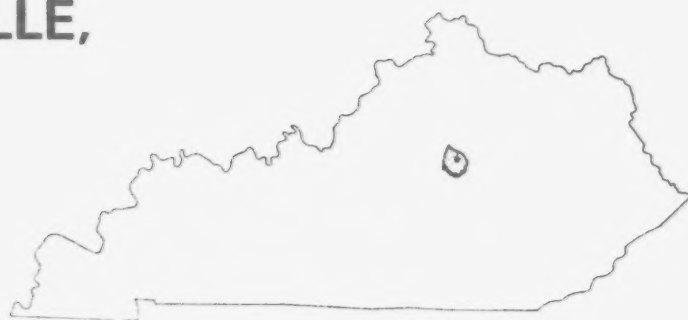


WAR 14 11

FLOOD INSURANCE STUDY



CITY OF NICHOLASVILLE,
KENTUCKY
JESSAMINE COUNTY



APRIL 17, 1989



Federal Emergency Management Agency

COMMUNITY NUMBER - 210126

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

TABLE OF CONTENTS

	<u>Page</u>
1.0 <u>INTRODUCTION</u>	1
1.1 Purpose of Study	1
1.2 Authority and Acknowledgments	1
1.3 Coordination	1
2.0 <u>AREA STUDIED</u>	1
2.1 Scope of Study	1
2.2 Community Description	3
2.3 Principal Flood Problems	3
2.4 Flood Protection Measures	3
3.0 <u>ENGINEERING METHODS</u>	3
3.1 Hydrologic Analyses	4
3.2 Hydraulic Analyses	5
4.0 <u>FLOODPLAIN MANAGEMENT APPLICATIONS</u>	6
4.1 Floodplain Boundaries	6
4.2 Floodways	6
5.0 <u>INSURANCE APPLICATION</u>	7
6.0 <u>FLOOD INSURANCE RATE MAP</u>	7
7.0 <u>OTHER STUDIES</u>	7
8.0 <u>LOCATION OF DATA</u>	7
9.0 <u>REFERENCES AND BIBLIOGRAPHY</u>	8

TABLE OF CONTENTS (continued)

			<u>Page</u>
		<u>FIGURE</u>	
Figure	1	- Vicinity Map	2

		<u>TABLE</u>	
Table	1	- Summary of Discharges	5

EXHIBITS

Flood Profiles

Town Fork

Panels 01P-04P

Flood Insurance Rate Map Index

Flood Insurance Rate Map

Elevation Reference Marks

FLOOD INSURANCE STUDY

CITY OF NICHOLASVILLE, JESSAMINE COUNTY, KENTUCKY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Nicholasville, Jessamine County, Kentucky, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey (USGS) (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-3-1823, Project Order No. 10. This study was completed in October 1986.

1.3 Coordination

A meeting was held on January 30, 1985, with representatives of the Study Contractor, FEMA, and the community.

On April 21, 1988, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Nicholasville, Jessamine County, Kentucky. The area of study is shown on the Vicinity Map (Figure 1).

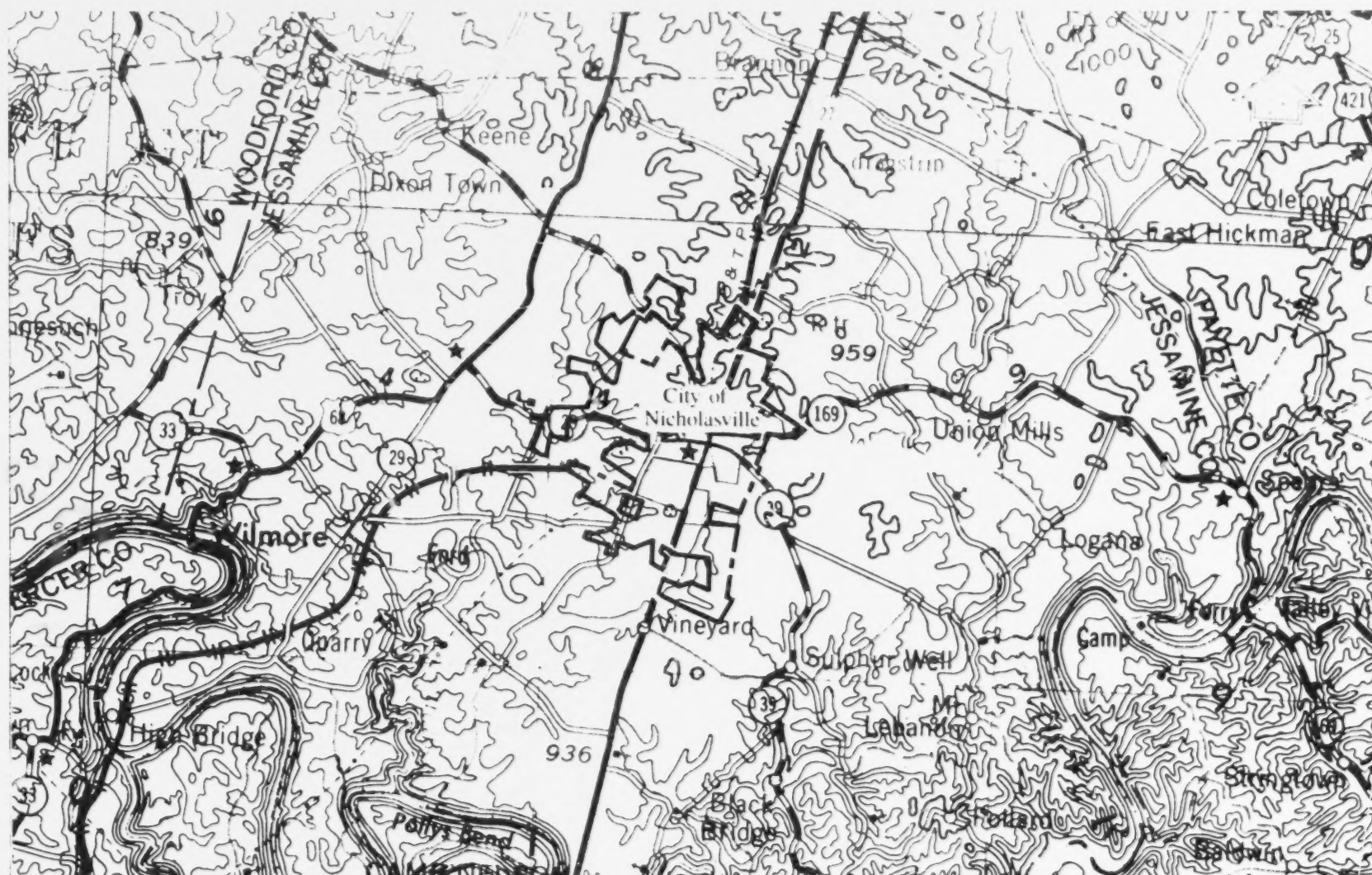


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF NICHOLASVILLE, KY
(JESSAMINE CO.)

APPROXIMATE SCALE

2 0 2 4 6 MILES

VICINITY MAP

Flooding caused by overflow of Town Fork was studied in detail within the community.

2.2 Community Description

The City of Nicholasville is located about 13 miles south of the City of Lexington, Kentucky, and is surrounded by the unincorporated areas of Jessamine County, Kentucky. The city is served by U.S. Route 27 and the Norfolk Southern railroad. The 1980 population of Nicholasville was reported to be 10,400, an increase of 78 percent from the 1970 population (Reference 1).

2.3 Principal Flood Problems

Areas along Town Fork are subject to intermittent flash flooding due mostly to storms of high intensity and short duration. The greatest recorded flood on Town Fork occurred in the early 1930s. A flood comparable in magnitude to that flood occurred in July 1974. Both events caused appreciable damage to the central business district of Nicholasville. The extent of damage from the 1974 flood was due in large part to debris blocking flow through the conduit that runs beneath the central business district.

2.4 Flood Protection Measures

Channel improvements were made to Town Creek in 1936. These improvements consisted of dredging the channel and placing a lining of limestone rocks and mortar from just below the bridge on Chestnut Street to just above the bridge at the intersection of Ross Street and North Second Street. Dredging and improvements to the existing channel lining were made and a trash collector was installed just upstream of the conduit that runs underneath the central business district.

Two flood retention structures are on a tributary to Town Fork and are about 0.5 mile northeast of the downtown area off Lake Street. The upper lake, called Lake at the Orchard, was originally a farm pond that was modified in 1982. The lower lake, called Mingo Lake, was constructed in 1981 and is a multipurpose structure, but was primarily designed for flood retention.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the

same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The 100-year discharge values for Town Fork were obtained using multiple regression analyses relating peak flow to drainage basin characteristics. Frequency analyses for 30 USGS surface-water and crest-stage indicator stations with contributing drainage areas ranging from 0.13 to 53.30 square miles were defined using methods established for hydrologic regions five and six found in USGS Water Resources Investigations (WRI) Report 76-62 (Reference 2).

The entire period of record for each station through 1985 (ranging from 9 to 61 years) was used to determine the peak discharge frequency in accordance with procedures outlined in Bulletin No. 17B (Reference 3). An analysis by stepwise regression relating peak discharge to a number of basin characteristics was performed. The "best-fit" regression relation to estimate the 100-year discharge includes contributing drainage area and channel slope and has a standard error of 51 percent. This was done because relations given in WRI Report 76-62 (Reference 2) are based on data obtained from sites having drainage areas greater than ten square miles and only include peak-flow values through 1970. The computed values obtained using regression analyses compared to within 17 percent of those values using relations from WRI Report 76-62 (Reference 2). Values of contributing drainage area and channel slope were obtained from topographic maps (References 4 and 5). Statistical Analysis System Institute, Inc., programs were used to perform the regression analyses (Reference 6).

Adjustments for urbanization were made as appropriate to the discharge values obtained from the multiple regression analyses for Town Fork using established procedures (Reference 7) and based on information obtained from topographic maps or from field inspection. The 2-hour, 2-year rainfall intensity value for Madison County, which was needed for the adjustments, was obtained from "Rainfall Frequency Values for Kentucky" (Reference 8). The drainage area for Mingo Lake was omitted from the analysis and the 100-year release value for the structure was incorporated after all other adjustments had been made.

The 100-year discharge value was recomputed at certain intervals along the study reach when it was determined that an appreciable increase in inflow would affect water-surface profile computations.

Peak discharge-drainage area relationships for the 100-year flood of Town Fork are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (SQ MILES)</u>	<u>PEAK DISCHARGE (CFS) 100-YEAR</u>
TOWN FORK		
at downstream corporate limits	4.20	2,040
at confluence of unnamed tributary at river point 26,570 feet	2.76	1,690
at East Chestnut Street	2.42	1,490
just upstream of North Main Street	2.10	1,040
at North Second Street	1.63	660
at Norfolk Southern railroad	1.43	480

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Modified step-backwater analyses were used to determine the 100-year flood elevation for the Town Fork study area. This method is similar to the standard step-backwater analysis, but only the 100-year flood elevation without a floodway is determined.

The step-backwater program WSPRO (Reference 9) was used to compute the 100-year water-surface profile for the study reach. Sources of input data included surveyed cross sections, bridge geometry, and culvert geometry. A culvert analysis was performed using procedures established by the USGS (Reference 10).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles.

Roughness coefficients (Manning's "n") were obtained in the field and adjusted based on stereo photographs and USGS Paper 1849 (Reference 11). Values for the main channel average 0.03 for the lined section and 0.052 for the unimproved sections. Roughness values for the overbank areas average 0.110.

The initial water-surface elevation was computed using the slope-conveyance method. The upstream water-surface elevation from the culvert analysis at Norfolk Southern railroad was used as the starting elevation for the upper portion of the studied reach.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with contour intervals of 20 and 10 feet (References 4 and 5).

The 100-year floodplain boundary is shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

Floodways have not been shown or computed for this community. Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not

cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the City of Nicholasville, Kentucky (Reference 12).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

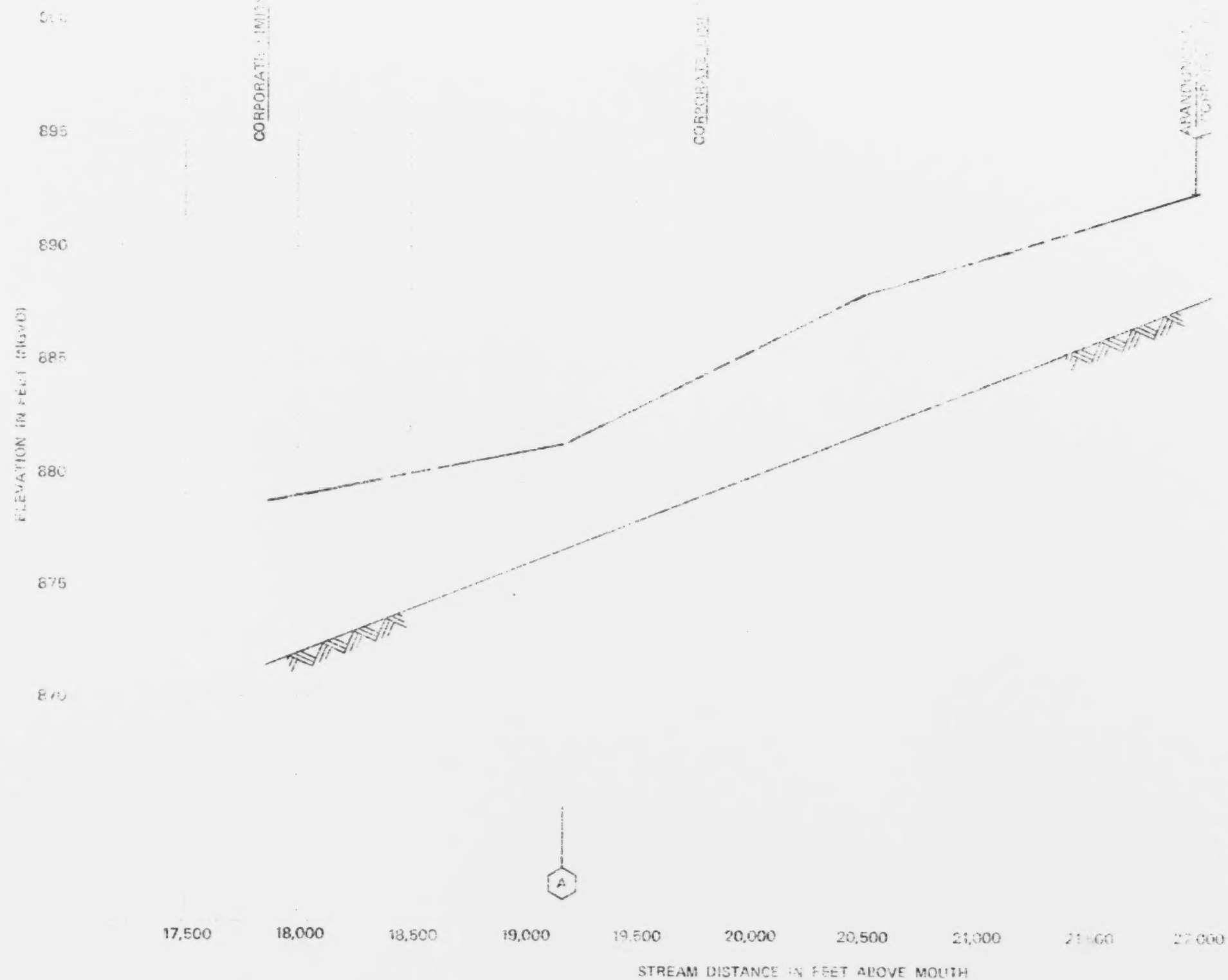
9.0 REFERENCES AND BIBLIOGRAPHY

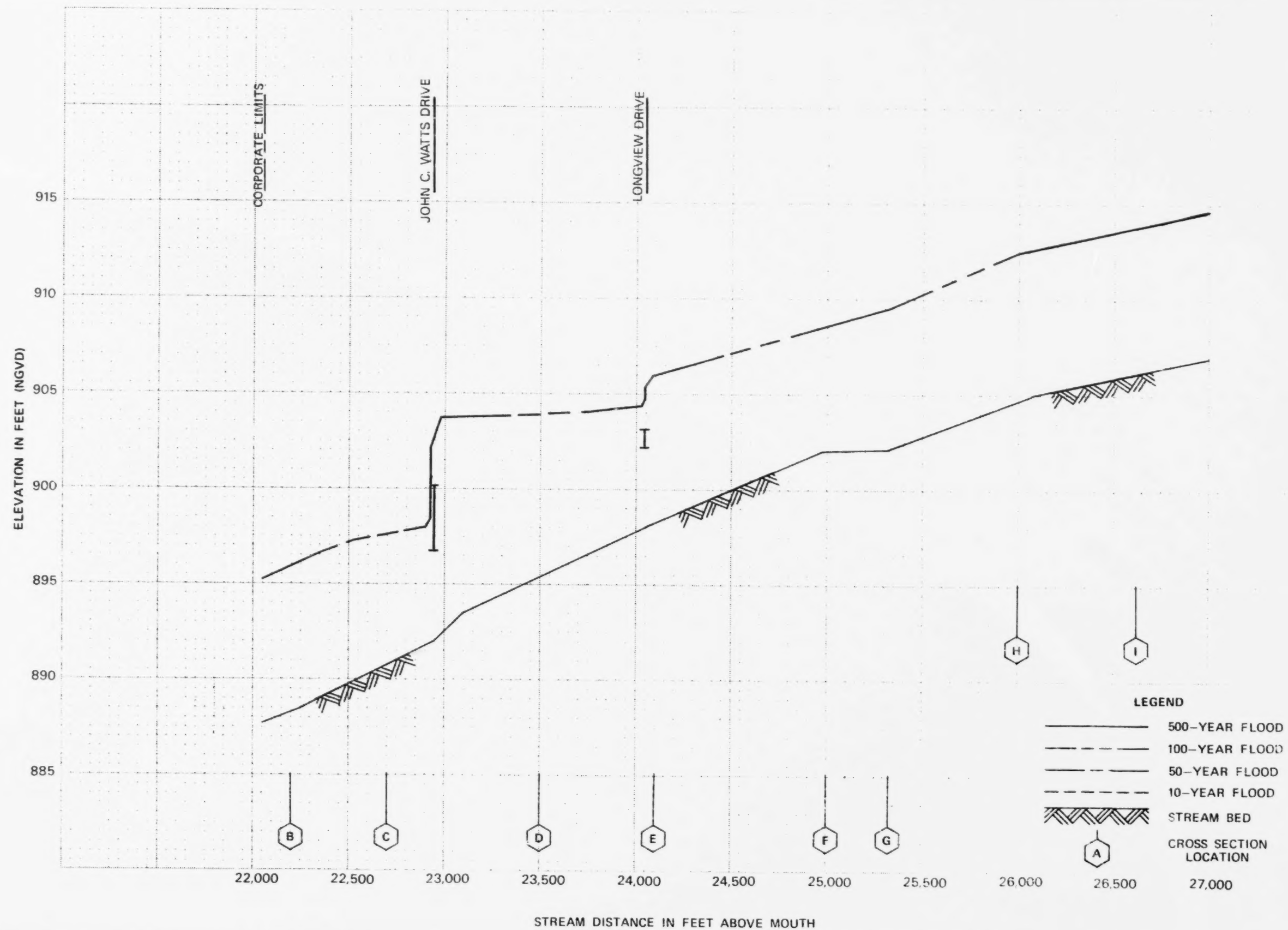
1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Kentucky, Washington, D.C., February 1982.
2. U.S. Geological Survey, Water Resources Investigations Report 76-62, Techniques for Estimating Magnitude and Frequency of Floods in Kentucky, C.H. Hannum, 1976.
3. U.S. Department of the Interior, Geological Survey, Interagency Advisory Committee on Water Data, Office of Water Data Coordination, Hydrology Subcommittee, Bulletin No. 17B, Guidelines for Determining Flood Flow Frequency, September 1981, revised March 1982.
4. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 20 feet: Little Hickman, Kentucky, 1952, photorevised 1979.
5. -----, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 Feet: Nicholasville, Kentucky, 1965; photorevised 1971.
6. Statistical Analysis System (SAS) Institute, Inc., SAS User's Guide: Statistics, 1982 Edition: N.C. Cary, 1982.
7. U.S. Department of the Interior, Geological Survey, Water Supply Paper 2207, Flood Characteristics of Urban Watersheds in the United States, V.R. Sauer, W.O. Thomas, Jr., J.A. Stricker, and K.U. Wilson, 1983.
8. Commonwealth of Kentucky, Department of Natural Resources and Environmental Protection, Division of Water Resources, Engineering Memorandum No. 2, Rainfall Frequency Values for Kentucky, August 1979.
9. U.S. Department of Transportation, Federal Highway Administration, Report No. FHWA/RD-86/108, Bridge Waterways Analysis Model: Research Report, J.O. Shearman, W.H. Kirby, V.R. Snyder, and H.N. Flippo, July 1986.
10. U.S. Geological Survey, Water Resources Investigations, Measurement of Peak Discharge at Culverts by Indirect Methods, Book 3, G.L. Bohaine, 1968.
11. U.S. Geological Survey, Water Supply Paper 1849, Roughness Characteristics of Natural Channels, H.H. Barnes, Jr., 1967.
12. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Nicholasville, Jessamine County, Kentucky, August 1978.

ELEVATION REFERENCE MARKS

Nicholasville, Kentucky

<u>REFERENCE MARK</u>	<u>FLOOD INSURANCE RATE MAP PANEL</u>	<u>ELEVATION (FEET NGVD)</u>	<u>DESCRIPTION OF LOCATION</u>
1	0002	979.44	U.S. Coast & Geodetic Survey disk stamped "F 154 1950" set in top of concrete post projecting 2 inches, located along Norfolk Southern railroad about 2,400 feet north of John Avenue
2	0002	953.95	U.S. Coast & Geodetic Survey disk stamped "E 154 1950" set in top of center of concrete foundation for south piers for North Third Street bridge over Norfolk Southern railroad, 18.3 feet east of switch stand
3	0002	935.72	U.S. Army Corps of Engineers tablet, not stamped, set in sidewalk at southeast corner of intersection of Ross Street and North Second Street, about 23 feet south of centerline of Ross Street, 12 feet east of North Second Street
4	0002	925.12	U.S. Army Corps of Engineers tablet, not stamped, set in sidewalk at northeast corner of north end of East Chestnut Street bridge over Town Fork, about 13.5 feet north of centerline of road
5	0003	900.14	chiseled square on northwest corner of north headwall of culvert for Town Fork under John C. Watts Drive





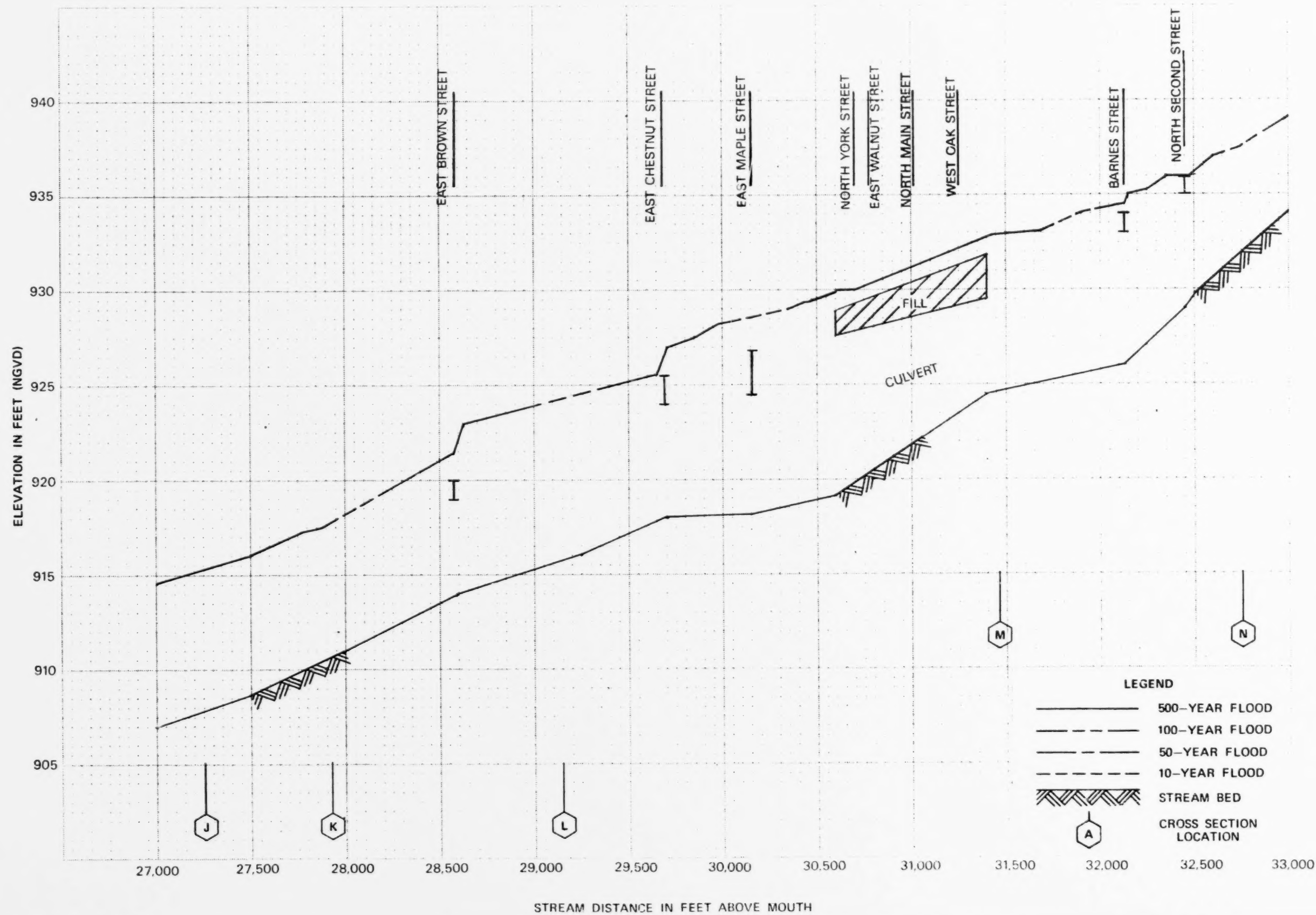
FLOOD PROFILES

TOWN FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF NICHOLASVILLE, KY
(JESSAMINE CO.)

02P



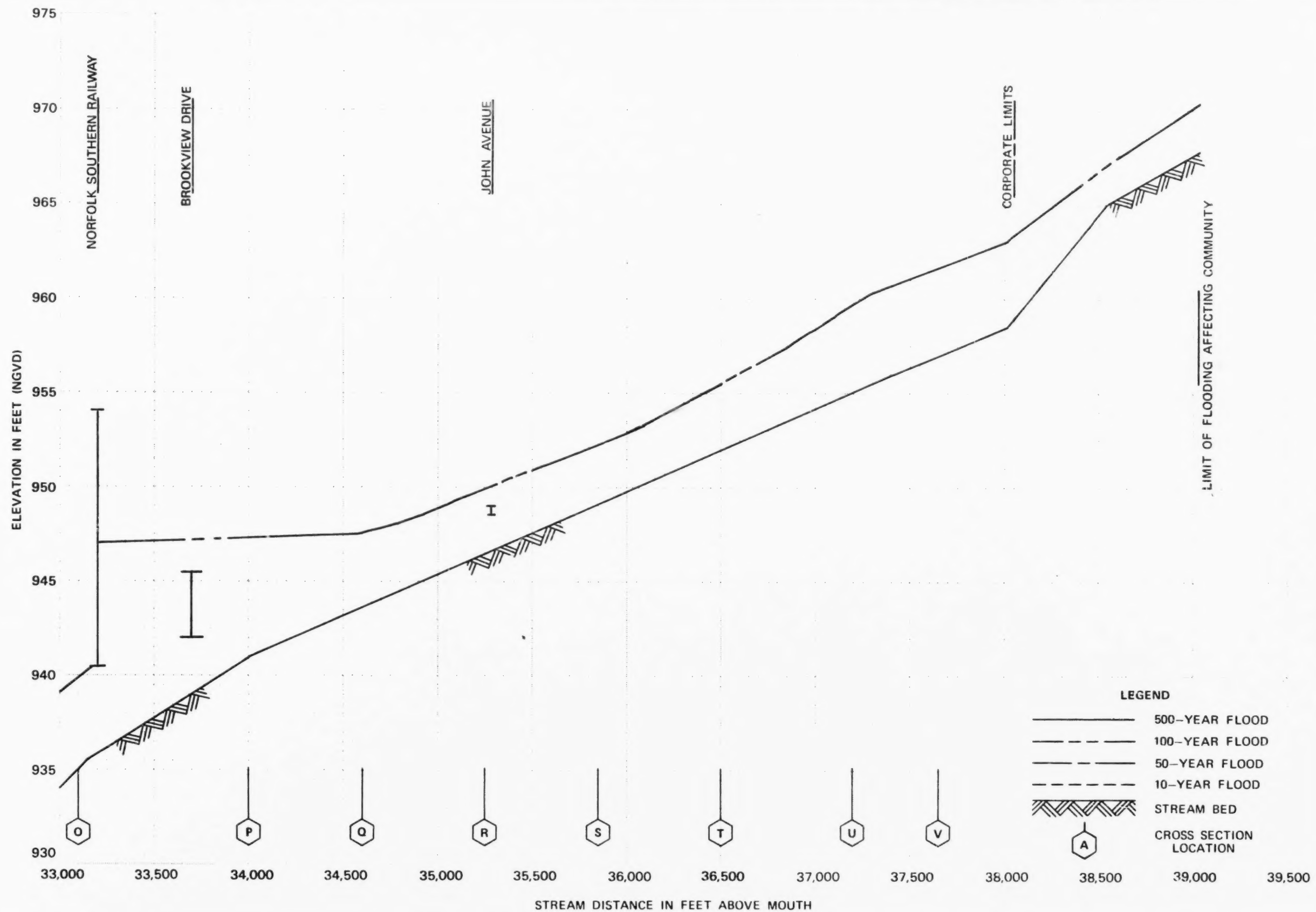
FLOOD PROFILES

TOWN FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF NICHOLASVILLE, KY
(JESSAMINE CO.)

03P



FLOOD PROFILES

TOWN FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF NICHOLASVILLE, KY
 (JESSAMINE CO.)

04P